



(86) Date de dépôt PCT/PCT Filing Date: 2015/12/07
(87) Date publication PCT/PCT Publication Date: 2016/07/07
(45) Date de délivrance/Issue Date: 2022/10/18
(85) Entrée phase nationale/National Entry: 2017/05/15
(86) N° demande PCT/PCT Application No.: US 2015/064173
(87) N° publication PCT/PCT Publication No.: 2016/109123
(30) Priorité/Priority: 2014/12/31 (US14/588,138)

(51) Cl.Int./Int.Cl. G06F 1/16 (2006.01),
G04G 17/00 (2013.01)

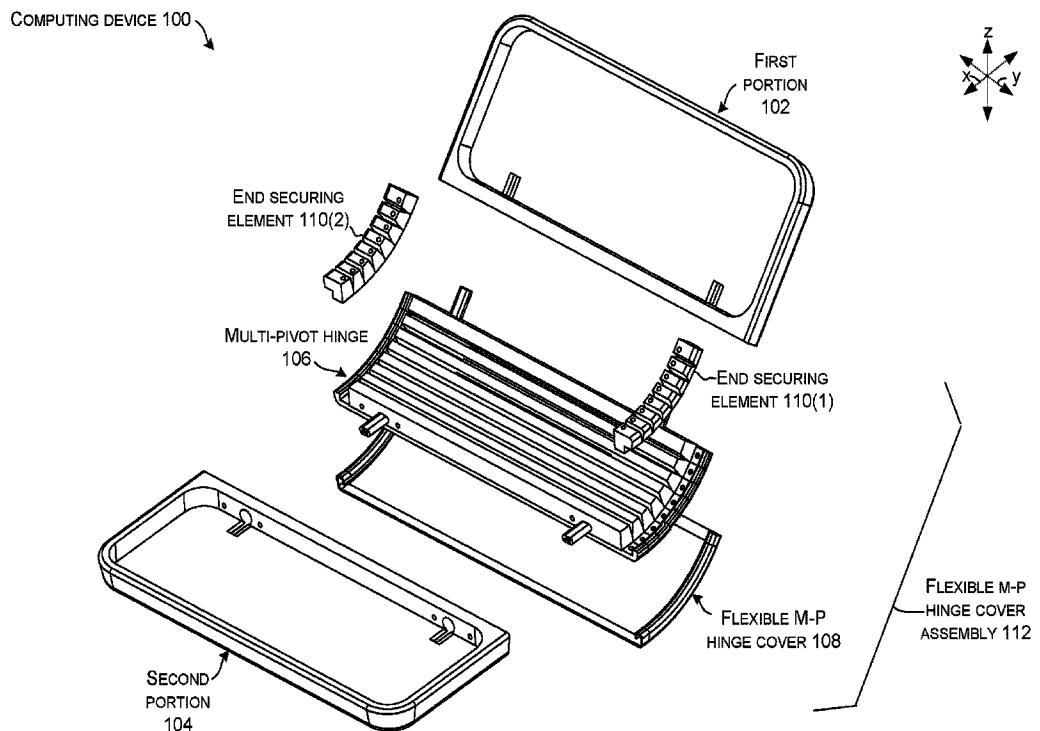
(72) Inventeurs/Inventors:
TAZBAZ, ERROL MARK, US;
HECHT, AVI, US;
ISHIHARA, JAMES ALEC, US

(73) Propriétaire/Owner:
MICROSOFT TECHNOLOGY LICENSING, LLC, US

(74) Agent: SMART & BIGGAR LLP

(54) Titre : COUVERCLE A ARTICULATION MULTI-PIVOT

(54) Title: MULTI-PIVOT HINGE COVER



(57) Abrégé/Abstract:

The description relates to devices, such as computing devices that have hinged portions. One example can include a first portion and a second portion. This example can also include a flexible multi-pivot hinge cover assembly rotatably securing the first and second portions.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(10) International Publication Number

WO 2016/109123 A1

(43) International Publication Date
7 July 2016 (07.07.2016)

(51) International Patent Classification:
G06F 1/16 (2006.01) *H04M 1/02* (2006.01)

(74) Agents: MINHAS, Sandip et al.; Microsoft Corporation, Attn: Patent Group Docketing (Bldg. 8/1000), One Microsoft Way, Redmond, Washington 98052-6399 (US).

(21) International Application Number:

PCT/US2015/064173

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(22) International Filing Date:

7 December 2015 (07.12.2015)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

14/588,138 31 December 2014 (31.12.2014) US

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

(71) Applicant: MICROSOFT TECHNOLOGY LICENSING, LLC [US/US]; Attn: Patent Group Docketing (Bldg. 8/1000), One Microsoft Way, Redmond, Washington 98052-6399 (US).

(72) Inventors: TAZBAZ, Errol Mark; Microsoft Technology Licensing, LLC, Attn: Patent Group Docketing (Bldg. 8/1000), One Microsoft Way, Redmond, Washington 98052-6399 (US). HECHT, Avi; Microsoft Technology Licensing, LLC, Attn: Patent Group Docketing (Bldg. 8/1000), One Microsoft Way, Redmond, Washington 98052-6399 (US). ISHIHARA, James Alec; Microsoft Technology Licensing, LLC, Attn: Patent Group Docketing (Bldg. 8/1000), One Microsoft Way, Redmond, Washington 98052-6399 (US).

[Continued on next page]

(54) Title: MULTI-PIVOT HINGE COVER

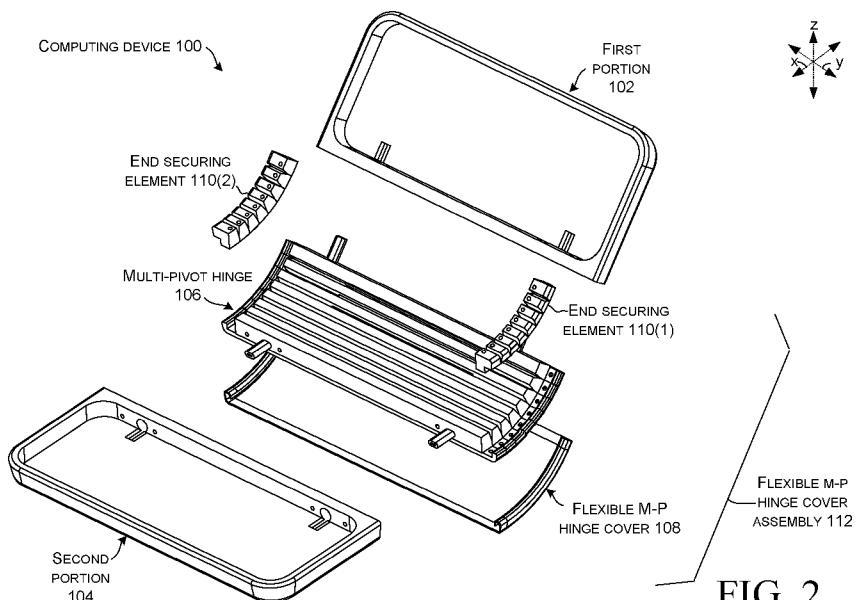


FIG. 2

(57) Abstract: The description relates to devices, such as computing devices that have hinged portions. One example can include a first portion and a second portion. This example can also include a flexible multi-pivot hinge cover assembly rotatably securing the first and second portions.

WO 2016/109123 A1



Declarations under Rule 4.17:

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))* — *with international search report (Art. 21(3))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

Published:

MULTI-PIVOT HINGE COVER

SUMMARY

[0001] According to yet another aspect of the present invention, there is provided a computing device, comprising: a first portion and a second portion; a multi-pivot hinge 5 rotatably securing the first portion and the second portion and configured to rotate around multiple hinge axes to provide rotation between the first and second portions; and, a flexible multi-pivot hinge cover that covers the multi-pivot hinge between the first portion and the second portion without any exposed edges, wherein side edges of the flexible multi-pivot hinge cover are shaped to roll over side edges of the multi-pivot hinge, wherein the shaped side edges 10 of the flexible multi-pivot hinge cover are held in place by end securing elements against the multi-pivot hinge.

BRIEF DESCRIPTION OF THE DRAWINGS

[0001a] The accompanying drawings illustrate implementations of the concepts conveyed in the present document. Features of the illustrated implementations can be more 15 readily understood by reference to the following description taken in conjunction with the accompanying drawings. Like reference numbers in the various drawings are used wherever feasible to indicate like elements. Further, the left-most numeral of each reference number conveys the FIG. and associated discussion where the reference number is first introduced.

[0002] FIG. 1 shows a perspective view of an example device that includes a flexible 20 multi-pivot hinge cover assembly example in accordance with some implementations of the present concepts.

[0003] FIG. 2 shows an exploded perspective view of the example device of FIG. 1.

[0004] FIG. 3 shows a perspective view of another example device that includes a flexible multi-pivot hinge cover assembly example in accordance with some implementations 25 of the present concepts.

[0005] FIG. 4 shows side elevational views of another example device that is similar to the device of FIG. 1.

[0006] FIG. 5 shows side elevational views of another example device that includes a flexible multi-pivot hinge cover assembly example in accordance with some implementations of the present concepts.

[0007] FIGS. 6-11C show an example of an assembly process for the example device 5 of FIG. 1 in accordance with some implementations of the present concepts.

DESCRIPTION

[0008] The present concepts relate to flexible multi-pivot hinge covers for multi-pivot or multi-axis hinges. Computing devices can employ multi-pivot hinges to rotatably secure portions of the computing device. The present concepts can provide flexible multi-pivot hinge 10 covers over the multi-pivot hinges to protect the hinges from foreign objects and/or protect a user of the computing device from being pinched by the multi-pivot hinges during rotation.

[0009] Introductory FIGS. 1 and 2 collectively show an example of a computing device 100. FIG. 2 is an exploded view of the computing device from a similar

perspective as FIG. 1. In this example, computing device 100 has first and second portions 102 and 104 that are rotatably secured together by a multi-pivot hinge 106. A flexible multi-pivot hinge cover 108 can extend from the first portion 102 to the second portion 104 to cover the multi-pivot hinge 106.

[00010] In this case, the flexible multi-pivot hinge cover 108 covers the ‘backside’ or ‘outside’ (e.g., facing away from the reader) of the computing device 100. In other cases, the flexible multi-pivot hinge cover 108 can cover the inside surface or both the inside and outside surfaces. In this implementation the flexible multi-pivot hinge cover 108 can be secured to the multi-pivot hinge 106 by opposing end securing elements 110(1) and 110(2). In this case, the end securing elements 110 can mimic a profile of the multi-pivot hinge 106 to appear generally continuous along the width of the computer (e.g., in the y reference direction). The multi-pivot hinge 106, the flexible multi-pivot hinge cover 108, and/or securing elements, such as end securing elements 110, can be thought of as a flexible multi-pivot hinge cover assembly 112.

[00011] As shown in FIG. 1, in various configurations, computing device 100 can also include an input element or device 114. In this case the input device 114 is manifest as a keyboard 116. Other implementations can employ other input devices. In this example, the computing device can also include a display screen 118, such as a touch sensitive display screen. The computing device can also include a processor 120, memory/storage 122, a battery 124, and/or a graphics processor 126, among other components. These elements can be positioned in the first portion 102 and/or second portion 104. (Components 114-126 are not shown in FIG. 2).

[00012] Flexible multi-pivot hinge cover assembly 112 can be secured to the first and second portions 102 and 104 to allow rotation therebetween. The flexible multi-pivot hinge cover assembly 112 can be secured to the first and second portions in a relatively permanent manner (e.g., in a manner that is not intended to be readily separable by an end use consumer), such as illustrated in FIGS. 1-2. Alternatively, the flexible multi-pivot hinge cover assembly 112 can be secured to the first and second portions in a relatively quickly attachable/detachable manner (e.g., in a manner that is intended to be readily separable by the end use consumer). One such example of this latter configuration is shown in FIG. 3.

[00013] FIG. 3 shows a view that is similar to the view of FIG. 1. In this case, computing device 100A includes first and second portions 102 and 104 that are rotatably secured by flexible multi-pivot hinge cover assembly 112A. In this example, the flexible

multi-pivot hinge cover assembly 112A is configured to allow an end use consumer to easily detach either or both of the first and second portions 102 and 104 from the flexible multi-pivot hinge cover assembly 112A as indicated by arrow 302. In this example the flexible multi-pivot hinge cover assembly 112A can include a quick attach/detach assembly 304. The quick attach/detach assembly 304 may include cooperatively operating elements or interfaces 306 and 308 located on the first portion 102 and the flexible multi-pivot hinge cover assembly 112A, respectively.

[00014] In one example, element 306 can be manifest as a latch and element 308 can be manifest as a receiver. The latch can engage the receiver to removeably couple the first portion 102 with the flexible multi-pivot hinge cover assembly 112A. In another example, the elements 306 and 308 may magnetically couple to one another in a manner that can be overcome by the user to separate the first portion from the flexible multi-pivot hinge cover assembly 112A. Other quick attach/detach assemblies 304 are contemplated. Note further that alternatively or additionally to mechanically coupling the flexible multi-pivot hinge cover assembly 112A to the first and/or second portions 102 and 104, the quick attach/detach assembly 304 can detachably electrically couple electronic components of the first and second portions. For instance, the quick attach/detach assembly 304 may electrically couple/decouple processor 120, storage/memory 122, and/or battery 124 from the first portion 102 to graphics processor 126 in the second portion 104.

[00015] Thus, the quick attach/detach assembly 304 can allow the user to be able to detach first portion 102 or second portion 104 to use either portion independent of the other. For example, first portion 102 may be operated as a stand-alone tablet device, and then may be attached to second portion 104 via flexible multi-pivot hinge cover assembly 112A to form a device more akin to a laptop device. A user may also be able to exchange first portion 102 or second portion 104 for application-specific devices. For example, an individual second portion may include a keyboard and/or a touchscreen. In certain scenarios, the user may attach a first touchscreen as the first portion and a second touchscreen as second portion, and utilize the device like a book. In other scenarios, a user may attach a touchscreen as the first portion and an input device, such as a keyboard and trackpad, as the second portion, and utilize the device like a laptop. Other configurations and implementations are contemplated.

[00016] FIG. 4 shows side views of the flexible multi-pivot hinge cover assembly 112B that is similar to the flexible multi-pivot hinge cover assembly 112 introduced in FIG. 1. Instance One shows the flexible multi-pivot hinge cover assembly 112B in an open or

deployed position and Instance Two shows a closed or storage position. For purposes of explanation the computing device 100B can be thought of as having an inner surface 402 and an outer surface 404. FIG. 4 shows hinge axes 406 (not all of which are designated) of the flexible multi-pivot hinge cover assembly 112B. A neutral axis 408 of the flexible multi-pivot hinge cover assembly 112B passes through (e.g., is defined by) the hinge axes 406. As the flexible multi-pivot hinge cover assembly 112B is rotated between the open position and the closed position the length of the neutral axis remains relatively constant. However, an inner hinge length 410 (measured at the inner surface 402) and an outer hinge length 412 (measured at the outer surface 404) can change as the position changes. For example, in the closed position of Instance Two, the inner length 410(2) is shorter than the inner length 410(1) in the open position of Instance One. In contrast, the outer length 412 increases as the flexible multi-pivot hinge cover assembly 112B is closed. For example, outer length 412(2) of Instance Two is greater than outer length 412(1) of Instance One. In some implementations, the flexible multi-pivot hinge cover can stretch or otherwise expand to accommodate the increase in length. In some cases, the flexible multi-pivot hinge cover can be stretchable such that it can be stretched to accommodate the longer closed position and then return to its original configuration and appearance when the multi-pivot hinge is opened.

[00017] Note that from one perspective, the multi-pivot hinge 106 can be thought of as a collection or set of hinge axes 406 interposed between hinge unit bodies 414 (not all of which are designated with specificity to avoid clutter on the drawing page). In some implementations, the hinge unit bodies 414 can be manifest as regular geometric shapes (when viewed along the y reference axis). For instance, in the illustrated configuration of FIG. 4, the hinge unit bodies can approximate a portion of a trapezoid. Though not specifically discussed below, in the illustrated configuration of FIG. 5, the hinge unit bodies 414 can approximate a portion of a rectangle. In these implementations the hinge unit bodies are all the same shape. In other implementations, the hinge unit bodies can have different shapes from one another.

[00018] FIG. 5 shows three views of an alternative computing device 100C. Instance One shows the computing device in an open position. Instance Two shows the computing device in an intermediate position and Instance Three shows the computing device in a closed position. This implementation can include a flexible display or flexible display screen 502 positioned on inner surface 402. Various flexible display technologies, such as flexible organic light emitting diode (OLED) or electronic paper, can be utilized.

[00019] From one perspective, the first portion 102, the multi-pivot hinge cover assembly 112C, and the second portion 104 can collectively define inner surface 402 and opposite outer surface 404 of the computing device 100C. The multi-pivot hinge cover assembly 112C can be configured to maintain a length 504 of the inner surface 402 during rotation of the first and second portions 102 and 104 while accommodating changes in length 506 of the outer surface 404 during the rotation. (The inner surface length 504 and the outer surface length 506 are only designated relative to Instance Two due to space constraints on the drawing page of FIG. 5.)

[00020] Note that the flexible multi-pivot hinge cover assembly 112C can allow the first and second portions 102 and 104 to be rotated through a range of rotations. In this implementation, the closed position of Instance Three orients the first and second portions at an angle α of approximately zero degrees to one another. (In this case, the closed position is actually less than zero degrees since zero degrees would entail the first portion being juxtaposed over and parallel to the second portion. Note also, that even in the closed position of Instance Three, the flexible multi-pivot hinge cover assembly 112C can maintain a minimum bend radius r which can protect the flexible display 502 from damage, such as creasing.) Instance Two shows the two portions 102 and 104 rotated to a typical use position for notebook (e.g., laptop) type devices where the angle α is an obtuse angle. Instance One shows a ‘flat’ configuration where angle α is about 180 degrees. This position can be used in an e-reader scenario. In some configurations, for example, in which flexible display 502 is capable of stretching in plane or is otherwise mechanically free to float or move on first portion 102, second portion 104, and/or the hinge section in a direction perpendicular to the axis of rotation, the range of rotation can continue until the first portion is oriented under the second portion at an angle α of about 360 degrees.

[00021] Note further, that while the illustrated configuration can be utilized for relatively large devices, such as notebooks, e-readers, and smart phones, this implementation also lends itself to relatively smaller implementations, such as wearable smart devices. For instance, computing device 100C could also be implemented as a smart watch. For example, a band of the smartwatch could be attached to the second portion 104 so that the band extends into and out of the drawing page in the y and -y reference directions. The user could close the smartwatch, such as in Instance Three, when not looking at the smartwatch to protect the flexible display 502. When the user wants to view the flexible display 502, the user can open the smartwatch to the orientation of Instance One or Instance Two to have a relatively large surface area of the flexible

display on a device that is relatively compact in the closed position of Instance Three. Stated another way, the combination of the flexible multi-pivot hinge cover assembly 112C and the flexible display can allow the smartwatch (or other device) to have nearly twice as much screen area as a traditional device having the same footprint as the smartwatch does in the closed configuration. Alternatively or additionally to utilizing the flexible multi-pivot hinge cover assembly 112C to couple the first and second portions 102 and 104, another flexible multi-pivot hinge cover assembly could be utilized in (or as) the band of the smartwatch.

[00022] FIGS. 6-11C offer additional details about the elements of computing device 100 while illustrating a method of manufacture of flexible multi-pivot hinge cover assembly 112.

[00023] FIG. 6 shows flexible multi-pivot hinge cover 108 (actually a precursor thereof) and a fixture 602. The flexible multi-pivot hinge cover 108 can be positioned on the fixture 602 as indicated at 604. The fixture can impart a specific shape in the flexible multi-pivot hinge cover 108. For instance, in this case, the shape of the fixture as indicated generally at 606 can mimic a shape of the flexible multi-pivot hinge cover assembly 112 in the deployed position (see FIG. 1-2). In another example, the fixture can include end structures 608 that can match dimensions of the multi-pivot hinge (see FIG. 7) to hold the multi-pivot hinge and shape the flexible multi-pivot hinge cover 108.

[00024] FIGS. 7-8 show that the multi-pivot hinge 106 can be positioned on the flexible multi-pivot hinge cover 108 in the fixture 602 as indicated at 702.

[00025] FIG. 9 shows side edges 902(1) and 902(2) of the flexible multi-pivot hinge cover 108 shaped to roll over the side edges of the multi-pivot hinge 106. The process of shaping, while not specifically shown, can be performed in various ways, such as with a fabric edge curling fixture. The shaped side edges 902 can be held in place by end securing elements 110 as indicated by arrows 904.

[00026] FIG. 10 shows how the ends 1002 of the multi-pivot hinge 106 can be interfaced to the first and second portions as indicated at 1004. The ends 1002 can then be secured in the first and second portions with various mechanisms, such as clamps, glue, screws, etc. The act of securing the multi-pivot hinge 106 to the first and second portions 102 and 104 can also be utilized to secure the top and bottom edges of the flexible multi-pivot hinge cover 108. For instance, the ends of the flexible multi-pivot hinge cover can be sandwiched between the first and second portions and the multi-pivot hinge 106 to

complete the flexible multi-pivot hinge cover assembly 112. This aspect is shown in more detail below relative to FIGS. 11-11C.

[00027] FIG. 11 shows the computing device 100 with the first portion 102 and the second portion 104 assembled with the flexible multi-pivot hinge cover assembly 112. In this implementation, the flexible multi-pivot hinge cover 108 can be secured, at least in part, by being compressed between individual elements. For instance, FIG. 11A shows an enlarged view of how the flexible multi-pivot hinge cover 108 can be secured between the end securing element 110(1) and the multi-pivot hinge 106. In this case, the flexible multi-pivot hinge cover has been shaped so that it is secured between two different opposing surfaces of the end securing element 110(1) and the multi-pivot hinge 106. In this example the first two opposing surfaces are manifest as 1102 of the multi-pivot hinge 106 and 1104 of the end securing element 110(1). The second two opposing surfaces are manifest as 1106 of the multi-pivot hinge 106 and 1108 of the end securing element 110(1). In this implementation these two sets of different opposing surfaces 1102/1104 and 1106/1108 are oriented at approximately right angles to one another to enhance the retaining force on flexible multi-pivot hinge cover 108.

[00028] FIG. 11B shows how flexible multi-pivot hinge cover 108 can be secured between the multi-pivot hinge 106 and the second portion 104 (and similarly first portion 102). In this implementation, second portion 104 includes a protruding bearing surface 1110 that helps to ensure firm compression of the flexible multi-pivot hinge cover 108 between the multi-pivot hinge 106 and the second portion 104. The protruding bearing surface 1110 can ensure adequate compression of the flexible multi-pivot hinge cover 108 before other portions of the second portion 104 contact the multi-pivot hinge 106.

[00029] FIG. 11C shows a corner region of the flexible multi-pivot hinge cover assembly 112. The corner region can be thought of as an intersection between a portion (e.g., edge) of the flexible multi-pivot hinge cover 108 secured generally along the y reference axis between the first portion 102 and the multi-pivot hinge 106 and another portion (e.g., edge) secured generally along the x reference axis between the multi-pivot hinge 106 and the end securing element 110(1). In this corner region extra material of the flexible multi-pivot hinge cover 108 may be encountered. The end securing element 110(1) can include a void or pocket to accommodate this extra material so that the extra material does not interfere with securing the flexible multi-pivot hinge cover 108 to the computing device 100. The pocket is difficult to visualize in the line drawing of FIG. 11C, but a general location of the pocket is indicated at 1112.

[00030] FIGS. 11-11C illustrate an implementation where all edges of the flexible multi-pivot hinge cover 108 are trapped between elements of the computing device 100. This configuration can ensure that no edges of the flexible multi-pivot hinge cover 108 are exposed in a manner that can allow them to be snagged or otherwise come loose during use. This configuration can protect the user from the underlying multi-pivot hinge in a manner that is both attractive and durable.

[00031] The flexible multi-pivot hinge cover 108 can be made from various materials, such as fabrics, polymers, composites, elastomers, woven or knitted materials, skins, leathers and/or any other covering that is capable of expansion and contraction while remaining taught through the entire range of the hinge. In some implementations, a single (e.g. continuous) sheet can be utilized so that there are no seams exposed on the device (e.g. that can be seen by the user). Other elements of the flexible multi-pivot hinge cover assembly 112 can be made from various materials, such as sheet metals, die cast metals, and/or molded plastics, among others, or any combination of these materials.

[00032] Flexible multi-pivot hinge cover assembly 112 can be utilized with any type of computing device, such as but not limited to notebook computers, smart phones, wearable smart devices, and/or other types of existing, developing, and/or yet to be developed computing devices.

EXAMPLE METHODS

[00033] Various methods of manufacture, assembly, and use for flexible multi-pivot hinge cover assemblies are contemplated beyond those shown above relative to FIGS 1-11C.

ADDITIONAL EXAMPLES

[00034] Various examples are described above. Additional examples are described below. One example is manifest as a computing device that has a first portion that includes a display screen and a second portion that includes an input device. The example can also include a multi-pivot hinge rotatably securing the first portion and the second portion and configured to rotate around multiple hinge axes to provide rotation between the first and second portions. The example can further include a flexible multi-pivot hinge cover that covers the multi-pivot hinge between the first portion and the second portion and that is configured to accommodate length changes of the multi-pivot hinge during the rotation. The example can also include opposing end securing elements configured to secure the flexible multi-pivot hinge cover to the multi-pivot hinge between the first and second portions.

[00035] Any combination of the above and/or below examples where the display screen is a flexible display screen that extends over the first portion, the multi-pivot hinge, and the second portion.

[00036] Any combination of the above and/or below examples where a neutral axis of the multi-pivot hinge is against the flexible display screen.

[00037] Any combination of the above and/or below examples where the flexible multi-pivot hinge cover completely encloses the multi-pivot hinge or where the flexible multi-pivot hinge cover covers only an inside surface of the multi-pivot hinge or an outside surface of the multi-pivot hinge.

[00038] Any combination of the above and/or below examples where a range of rotation of the multi-pivot hinge is less than or equal to 180 degrees or wherein the range of rotation is between 180 degrees and 360 degrees.

[00039] Another example is manifest as a first portion and a second portion. The example can also include a multi-pivot hinge rotatably securing the first portion and the second portion and configured to rotate around multiple hinge axes to provide rotation between the first and second portions. The example can further include a flexible multi-pivot hinge cover that covers the multi-pivot hinge between the first portion and the second portion without any exposed edges.

[00040] Any combination of the above and/or below examples where the multi-pivot hinge is configured to rotate the first and second portions from an open orientation where the first and second portions define an obtuse angle therebetween to a closed orientation where the first portion is juxtaposed over the second portion and wherein the flexible multi-pivot hinge cover is configured to stretch in the closed orientation.

[00041] Any combination of the above and/or below examples where a first edge of the flexible multi-pivot hinge cover is secured between the first portion and the multi-pivot hinge and a second edge of the flexible multi-pivot hinge cover is secured between the second portion and the multi-pivot hinge.

[00042] Any combination of the above and/or below examples where a third edge of the flexible multi-pivot hinge cover is secured between the multi-pivot hinge and a first end securing element and a fourth edge of the flexible multi-pivot hinge cover is secured between the multi-pivot hinge and the second end securing element.

[00043] Any combination of the above and/or below examples where the flexible multi-pivot hinge cover comprises a single piece of elastic fabric.

[00044] Any combination of the above and/or below examples where the first portion, the multi-pivot hinge, and the second portion collectively define an inner surface and an opposite outer surface and wherein the multi-pivot hinge is configured to maintain a length of the inner surface during rotation of the first and second portions and wherein the flexible multi-pivot hinge cover is configured to accommodate changes in length of the outer surface during the rotation.

[00045] Any combination of the above and/or below examples where the multi-pivot hinge maintains a minimum bend radius throughout the rotation.

[00046] Any combination of the above and/or below examples further including a flexible display secured to the inner surface.

[00047] Any combination of the above and/or below examples where the multi-pivot hinge comprises multiple hinge axes interposed between multiple hinge unit bodies.

[00048] Any combination of the above and/or below examples where the hinge unit bodies are all a same shape or wherein the hinge unit bodies have different shapes.

[00049] Any combination of the above and/or below examples where the hinge unit bodies are regular geometric shapes.

[00050] Another example is manifest as a first portion and a second portion. The example can also include a flexible multi-pivot hinge cover assembly rotatably securing the first and second portions.

[00051] Any combination of the above and/or below examples where the second portion comprises a base of a smart watch.

[00052] Any combination of the above and/or below examples where the flexible multi-pivot hinge cover assembly allows the first portion to be rotated away from the second portion during use and closed upon the first portion when not in use.

[00053] Any combination of the above and/or below examples further including another flexible multi-pivot hinge cover assembly comprising a band of the smart watch.

CONCLUSION

[00054] Although techniques, methods, devices, systems, etc., pertaining to flexible multi-pivot hinge cover assemblies are described in language specific to structural features and/or methodological acts, it is to be understood that the subject matter defined in the appended claims is not necessarily limited to the specific features or acts described. Rather, the specific features and acts are disclosed as exemplary forms of implementing the claimed methods, devices, systems, etc.

CLAIMS:

1. A computing device, comprising:

a first portion and a second portion;

a multi-pivot hinge rotatably securing the first portion and the second portion and

5 configured to rotate around multiple hinge axes to provide rotation between the first and second portions; and,

10 a flexible multi-pivot hinge cover that covers the multi-pivot hinge between the first portion and the second portion without any exposed edges, wherein side edges of the flexible multi-pivot hinge cover are shaped to roll over side edges of the multi-pivot hinge, wherein the shaped side edges of the flexible multi-pivot hinge cover are held in place by end securing 15 elements against the multi-pivot hinge.

2. The computing device of claim 1, wherein the multi-pivot hinge is configured to rotate the first and second portions from an open orientation where the first and second portions define an obtuse angle (α) therebetween to a closed orientation where the first portion is juxtaposed 15 over the second portion and wherein the flexible multi-pivot hinge cover is configured to stretch in the closed orientation.

3. The computing device of claim 1, wherein a first edge of the flexible multi-pivot hinge cover is secured between the first portion and the multi-pivot hinge and a second edge of the flexible multi-pivot hinge cover is secured between the second portion and the multi-pivot 20 hinge.

4. The computing device of claim 3, wherein the side edges of the flexible multi-pivot hinge cover are secured between the multi-pivot hinge and the end securing elements.

5. The computing device of claim 1, wherein the flexible multi-pivot hinge cover comprises a single piece of elastic fabric.

6. The computing device of claim 1, wherein the first portion, the multi-pivot hinge, and the second portion collectively define an inner surface and an opposite outer surface and wherein the multi-pivot hinge is configured to maintain a length of the inner surface during rotation of the first and second portions and wherein the flexible multi-pivot hinge cover is configured to
5 accommodate changes in length of the outer surface during the rotation.
7. The computing device of claim 6, wherein the multi-pivot hinge maintains a minimum bend radius throughout the rotation.
8. The computing device of claim 7, further comprising a flexible display secured to the inner surface.
- 10 9. The computing device of claim 1, wherein the multi-pivot hinge comprises multiple hinge axes interposed between multiple hinge unit bodies.
10. The computing device of claim 9, wherein the hinge unit bodies are all a same shape or wherein the hinge unit bodies have different shapes.
11. The computing device of claim 9, wherein the hinge unit bodies are regular geometric
15 shapes.
12. The computing device of claim 1, wherein the second portion comprises a base of a smart watch.
13. The computing device of claim 12, wherein the flexible multi-pivot hinge allows the first portion to be rotated away from the second portion during use and closed upon the first
20 portion when not in use.
14. The computing device of claim 13, further comprising another flexible multi-pivot hinge comprising a band of the smart watch.

1/11

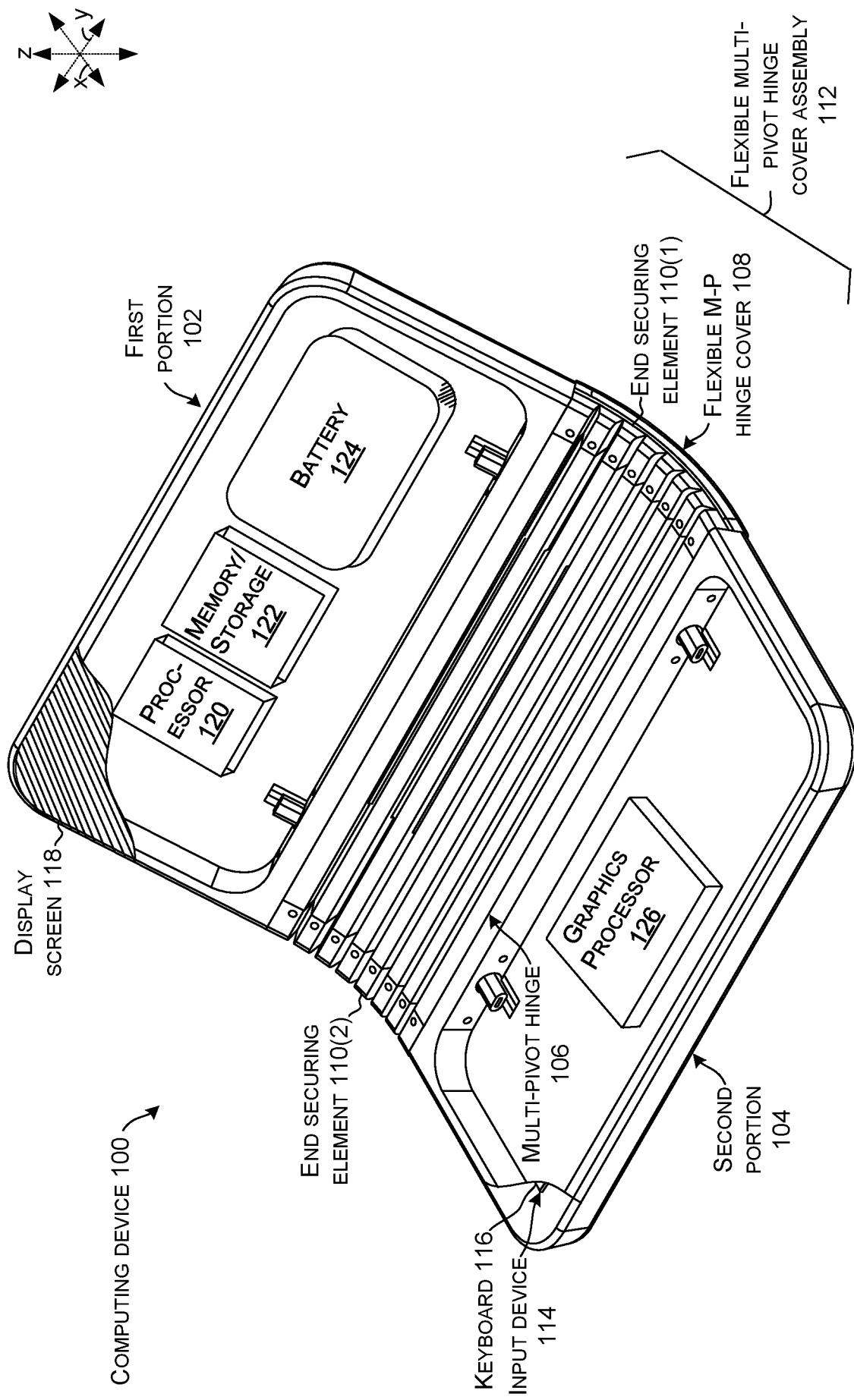
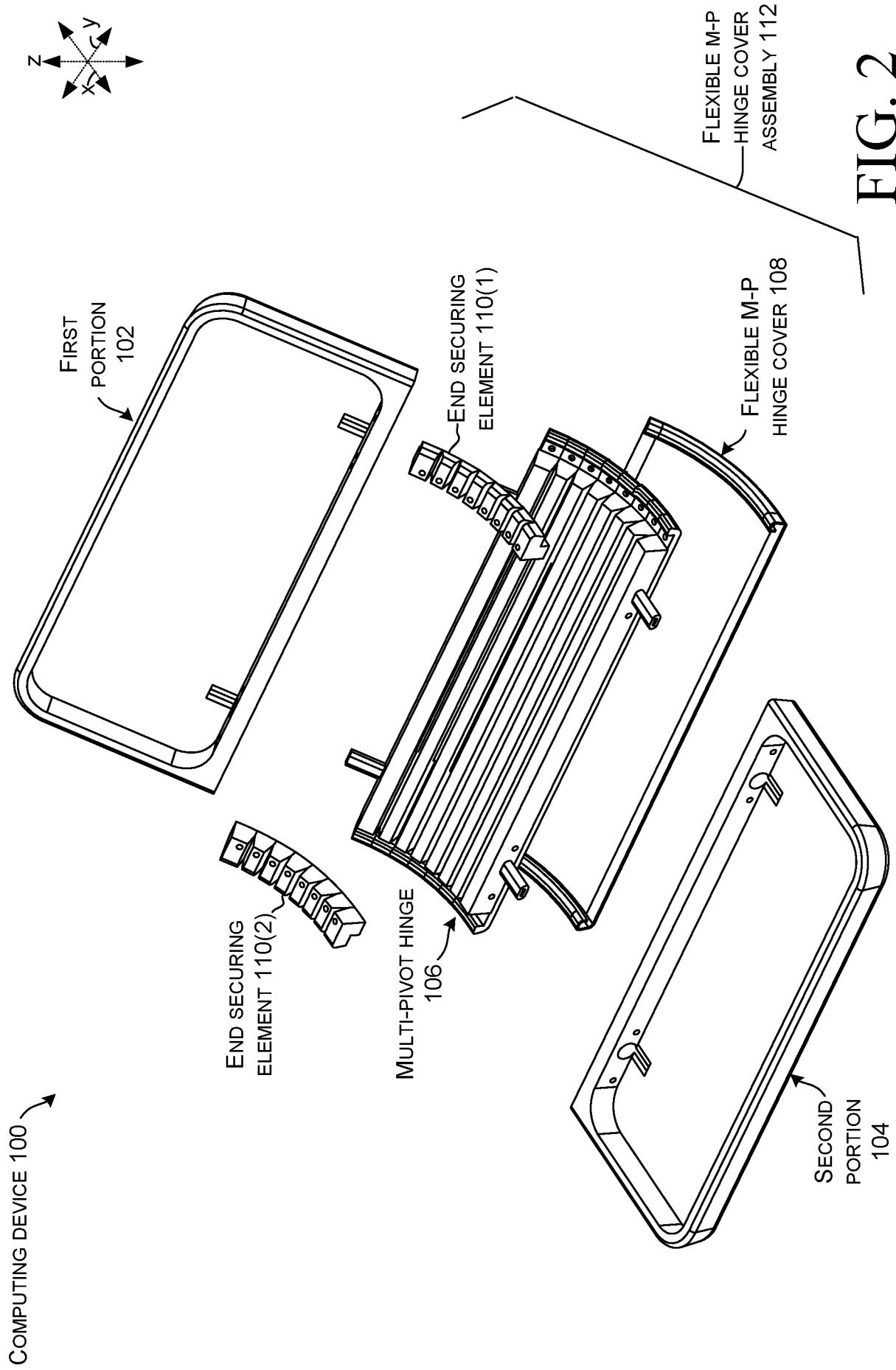


FIG. 1

2/11



3/11

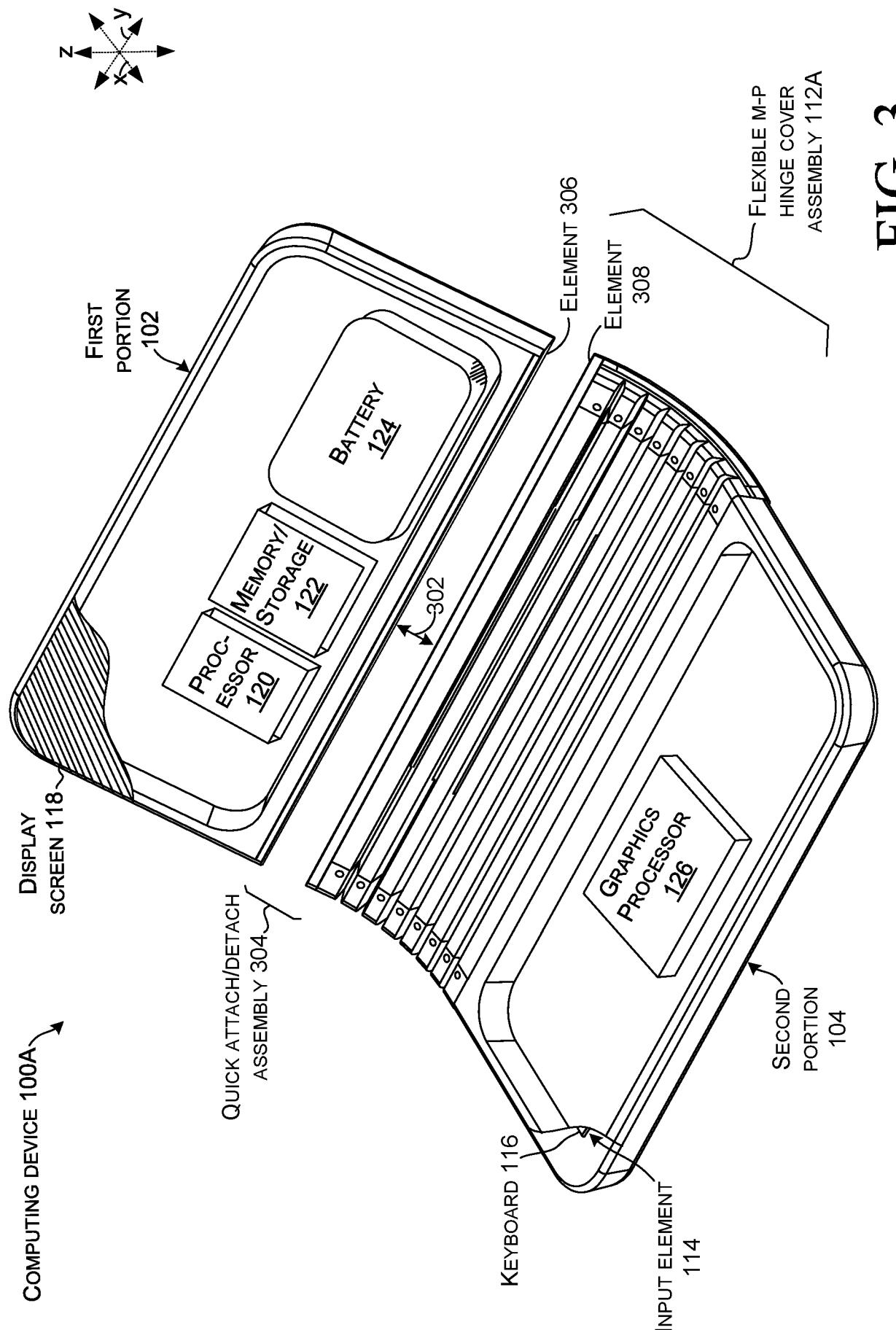


FIG. 3

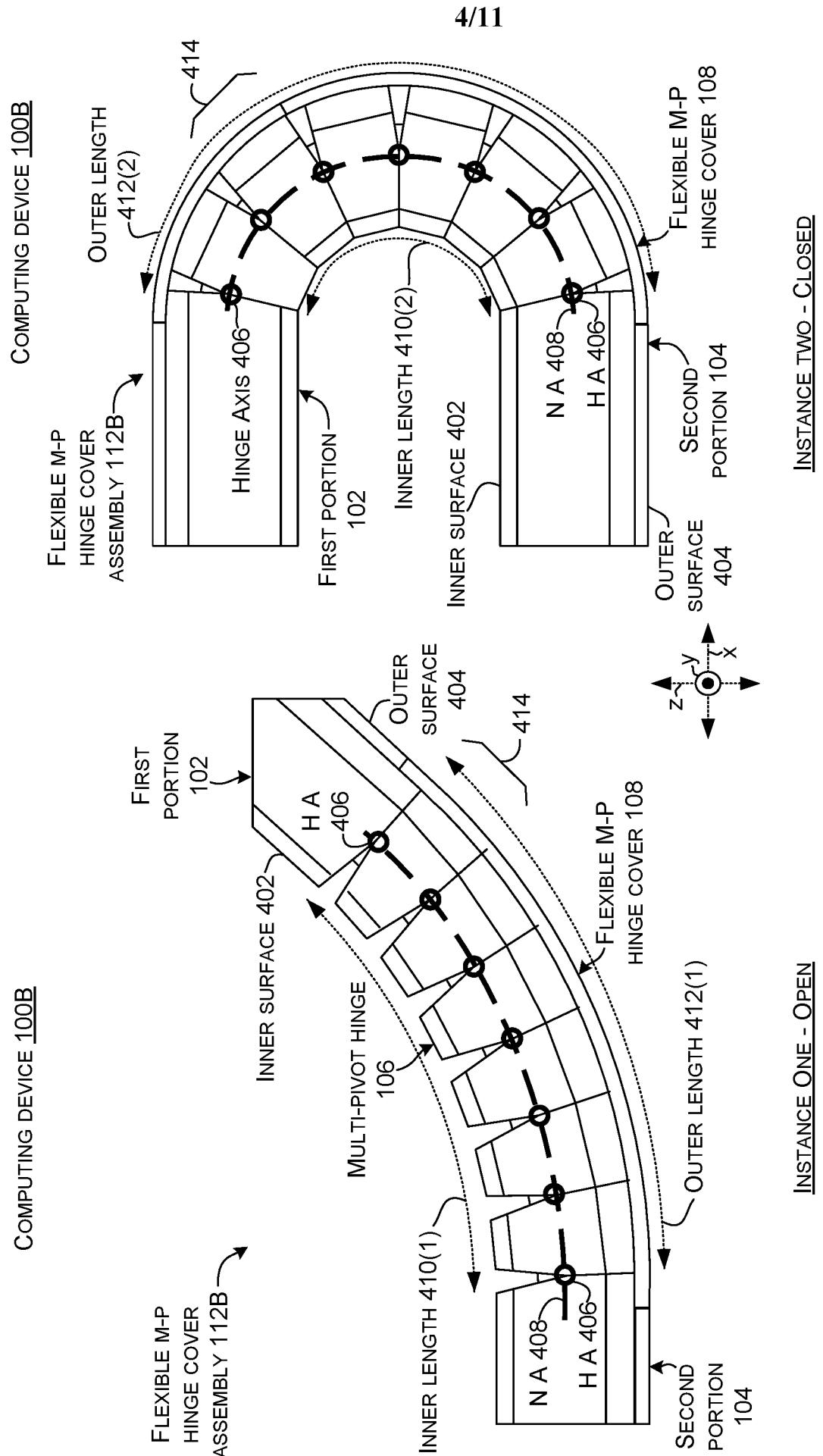


FIG. 4

5/11

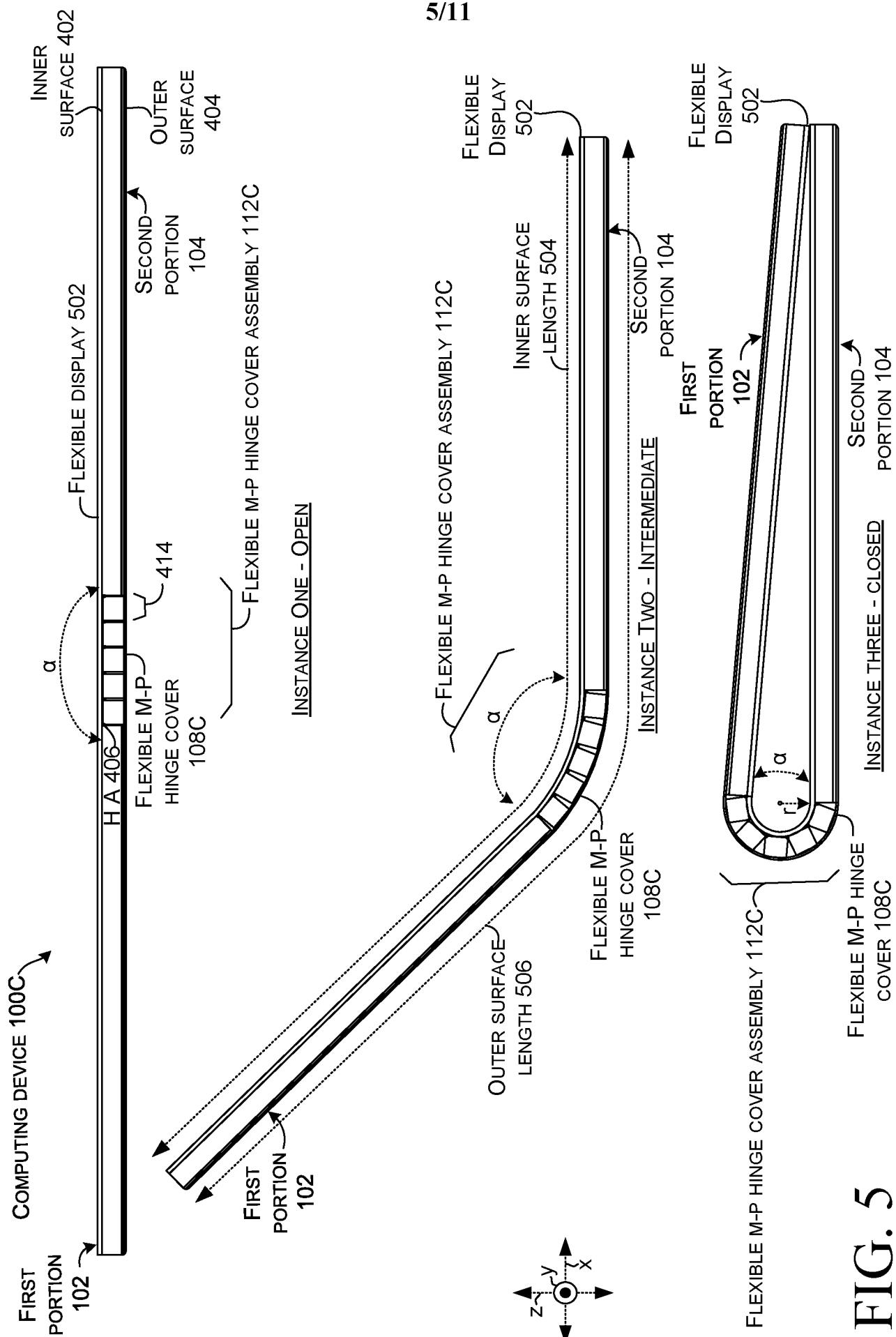


FIG. 5

6/11

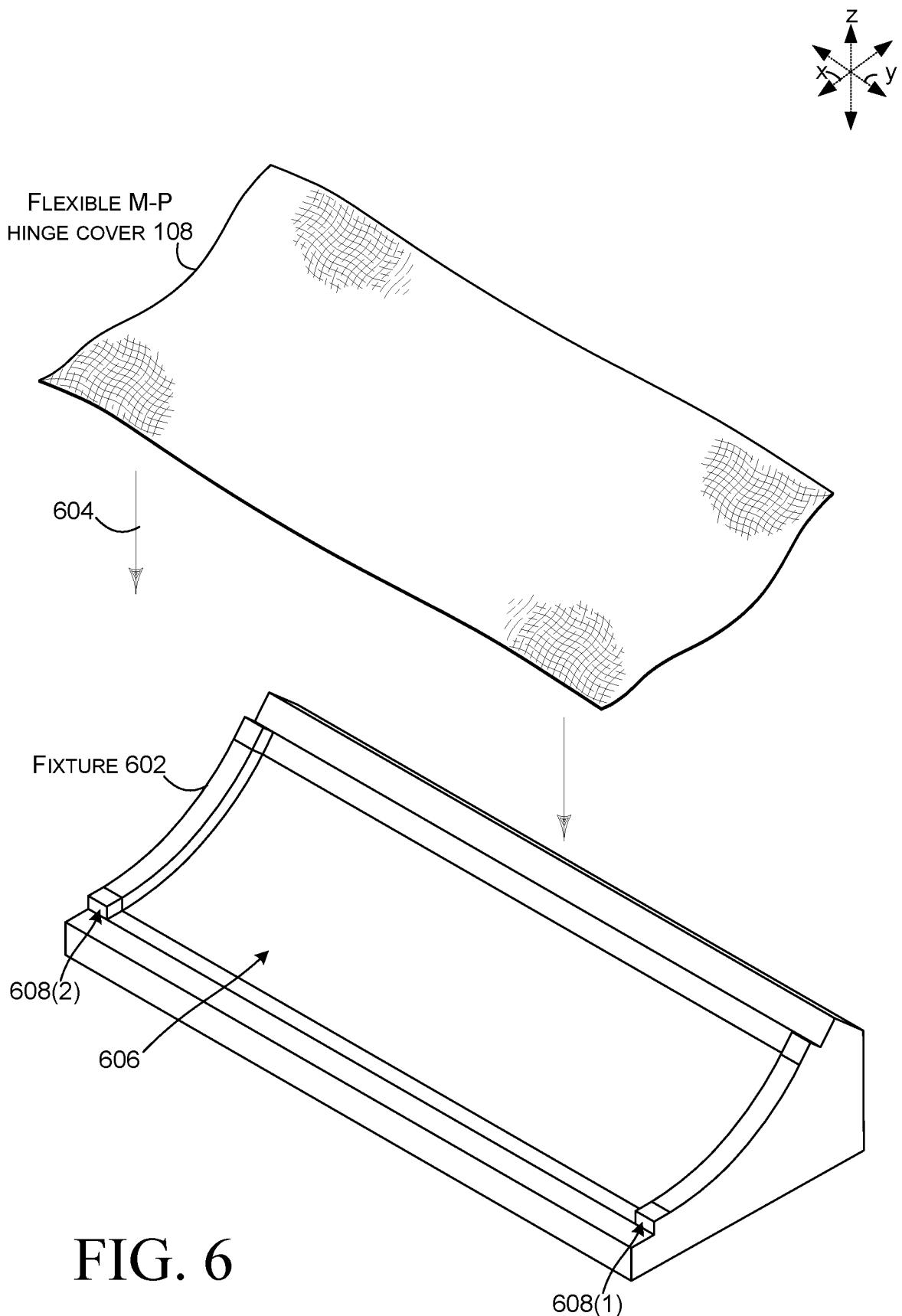


FIG. 6

7/11

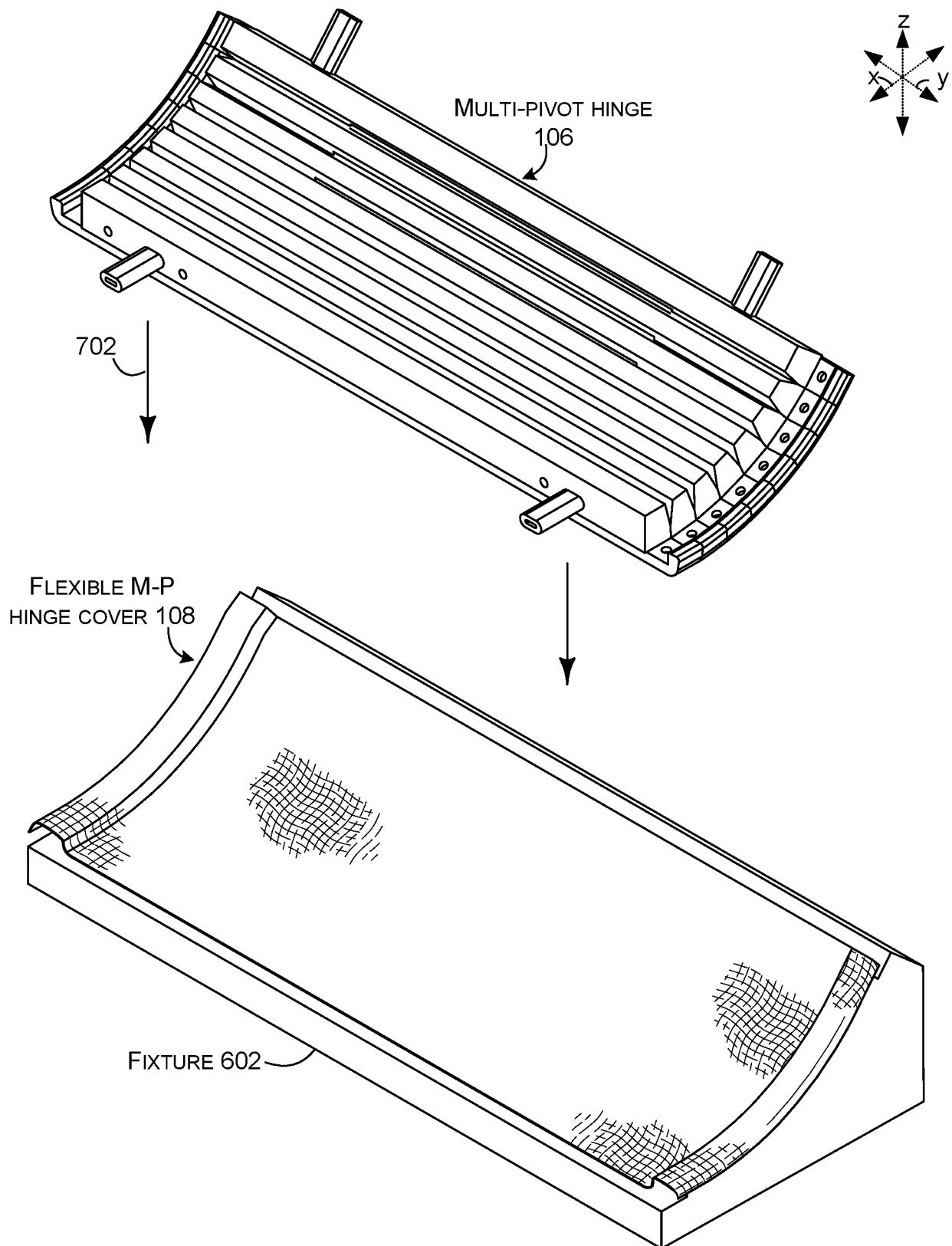


FIG. 7

8/11

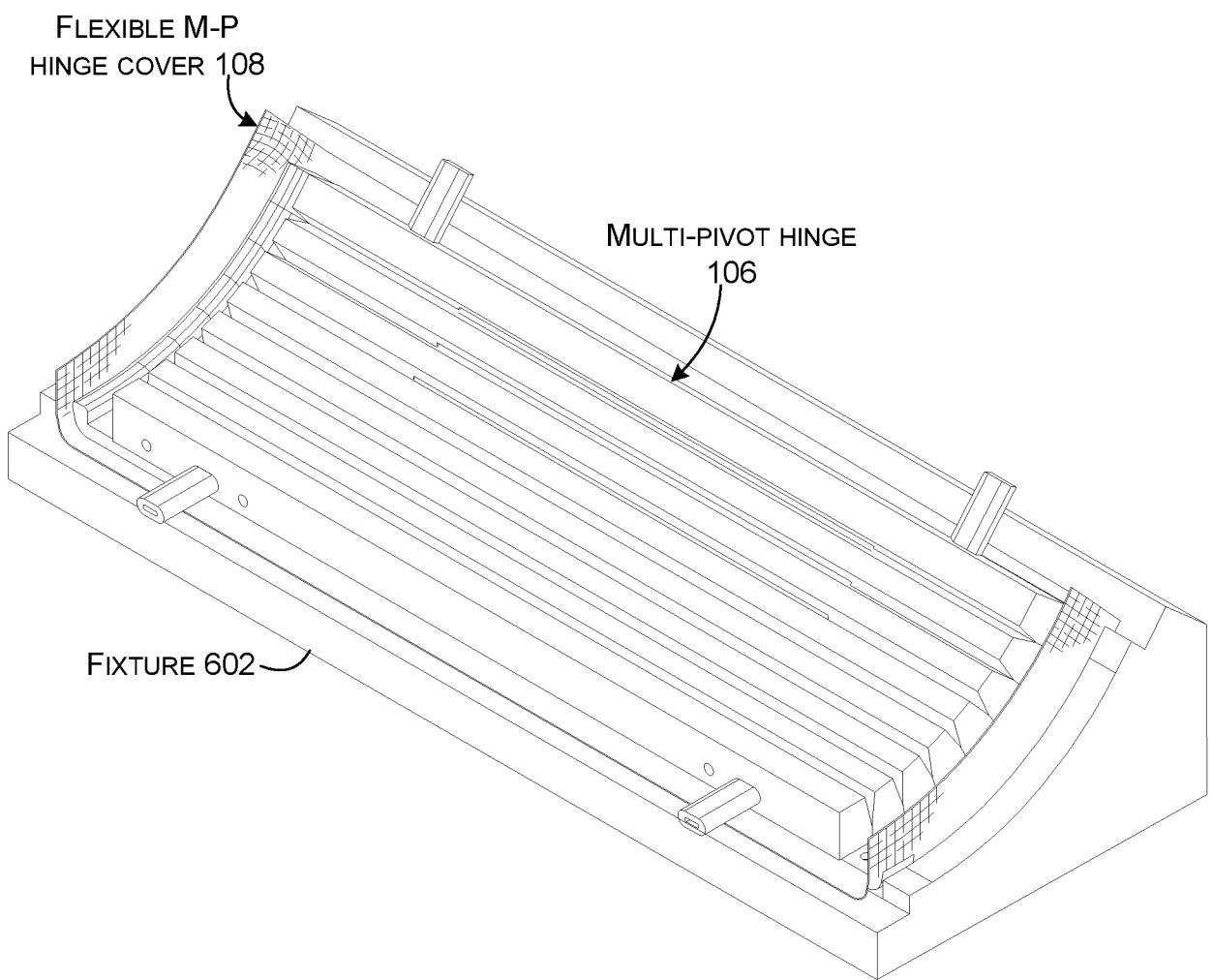
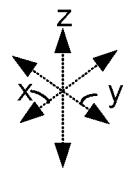


FIG. 8

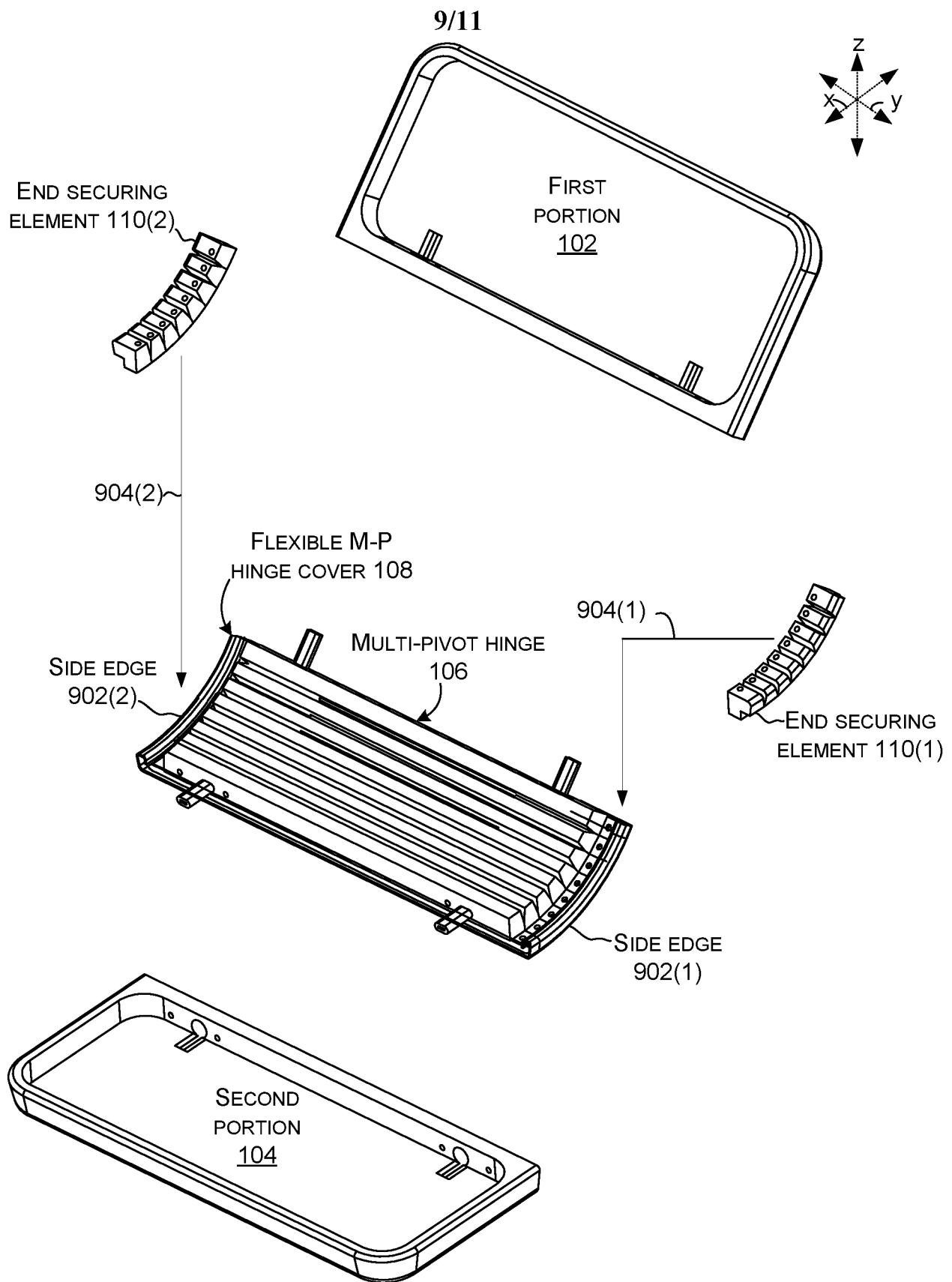


FIG. 9

10/11

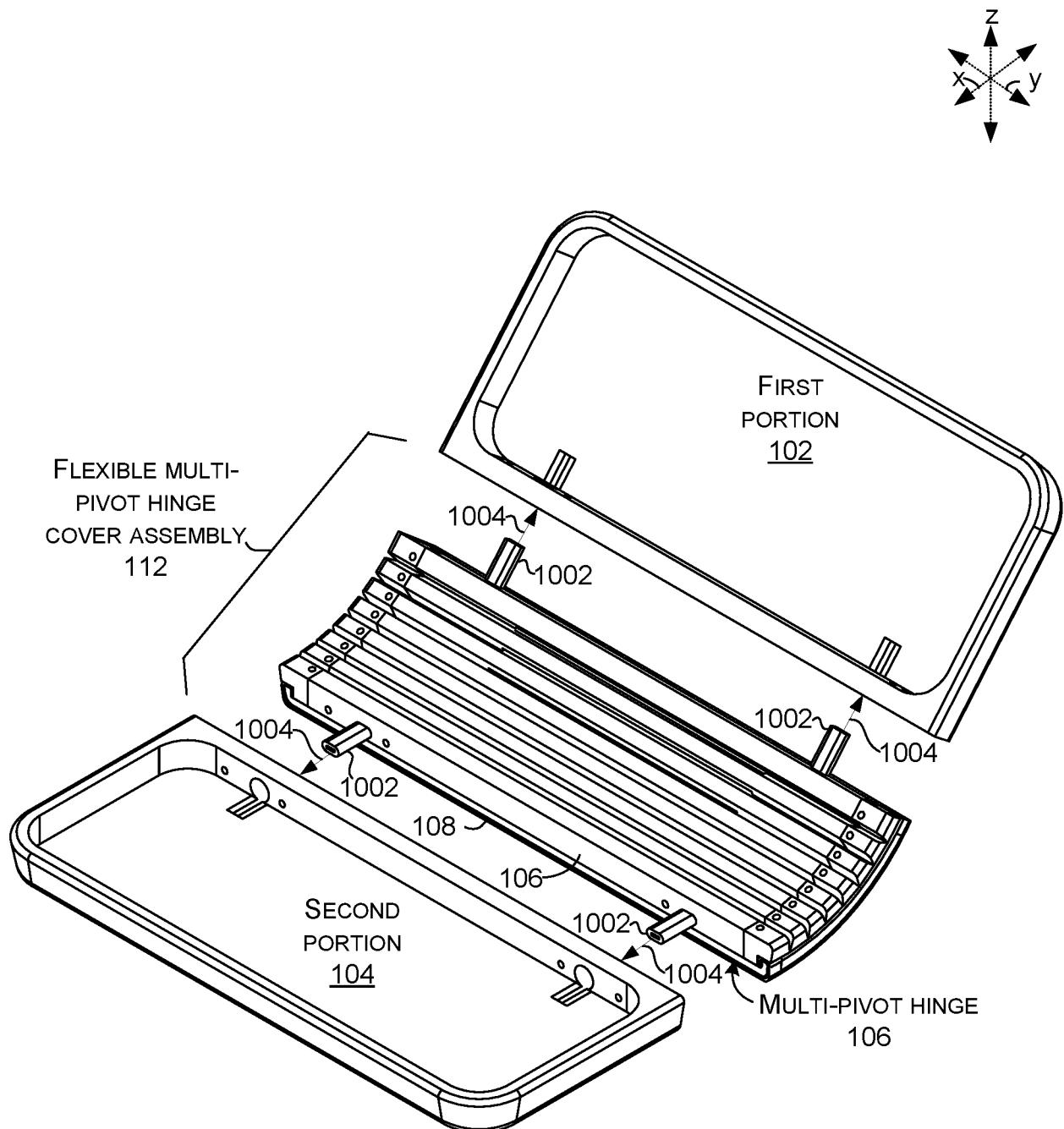
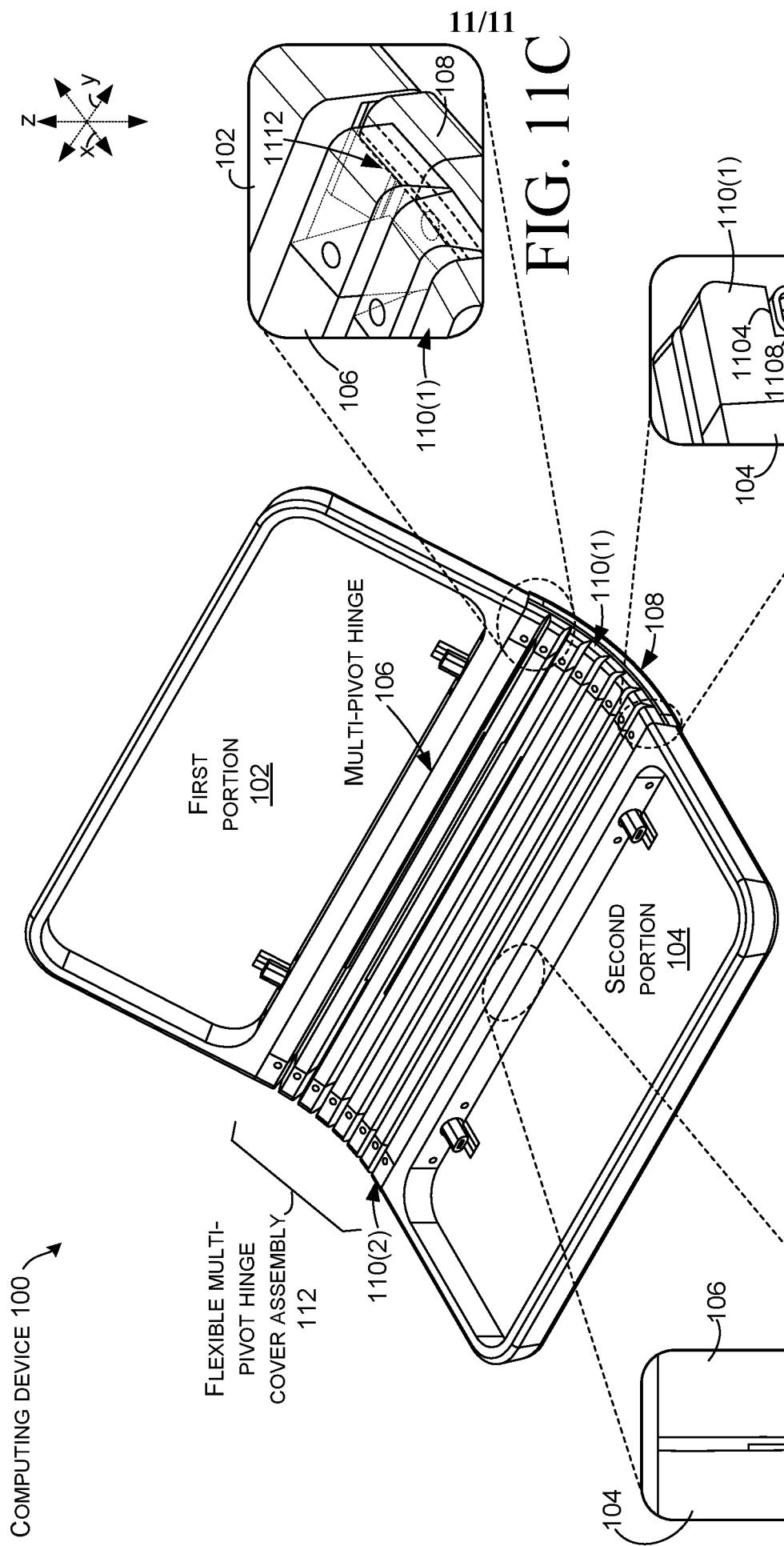


FIG. 10



COMPUTING DEVICE 100



FIRST
PORTION
102

END SECURING
ELEMENT 110(2)

MULTI-PIVOT HINGE
106

END SECURING
ELEMENT 110(1)

SECOND
PORTION
104

FLEXIBLE M-P
HINGE COVER
108

FLEXIBLE M-P
HINGE COVER
ASSEMBLY 112